

Diploglossus lessonae Peracca, 1890 (Squamata: Anguidae): new records from northeast Brazil and notes on distribution

Francis Luiz Santos Caldas^{1*}, Daniel Oliveira Santana¹, Renato Gomes Faria², Adriana Bocchiglieri² and Daniel Oliveira Mesquita¹

1 Universidade Federal da Paraíba, Programa de Pós-Graduação em Ciências Biológicas (Zoologia). Cidade Universitária, CEP 58059-900, João Pessoa, PB, Brazil

2 Universidade Federal de Sergipe, Programa de Pós-Graduação em Ecologia e Conservação. Cidade Universitária Prof. José Aloísio de Campos, CEP 49100-000, São Cristóvão, SE, Brazil

* Corresponding author. E-mail: francisl Luiz_bio@hotmail.com

Abstract: The family Anguidae contains three subfamilies: Gerrhonotinae, Anguinae, and Diploglossinae. In Brazil, there are four described anguid species, all from the subfamily Diploglossinae. Herein, we present the first records of *Diploglossus lessonae* Peracca, 1890 from the state of Sergipe and new records for the states of Paraíba and Ceará. The records compiled here for the Caatinga can reveal a pattern of widely distributed species in the biome.

Key words: lizards; Diploglossinae; Sergipe; Caatinga; Atlantic Forest

The family Anguidae contains three subfamilies: Gerrhonotinae occurs strictly in North and Central America, Anguinae is the only found in the Old World, and

Diploglossinae is distributed in Mexico, the West Indies, and South America (Macey et al. 1999). The Diploglossinae contains three genera (*Diploglossus*, *Celestus*, and *Ophiodes*) with the possibility of paraphyly in *Diploglossus* (Pyron et al. 2013). In Brazil, there are four Anguidae species: *Ophiodes striatus* (Spix, 1825), *Ophiodes yacupoi* Gallardo, 1966, *Diploglossus fasciatus* (Gray, 1831), and *Diploglossus lessonae* Peracca, 1890, all Diploglossinae (Costa and Bérnils 2014).

Diploglossus lessonae Peracca, 1890 (Figures 1 and 2) is an active forager found in northeastern Brazil and characterized by semifossorial habits associated with litter, fallen logs, and rock crevices (Vitt 1995; Passos et al. 2011). The juveniles mimic the toxic millipede *Rhinocricus albidolimbatus* (Porat, 1876), in that the number of births increases precisely when their models (millipedes) are more abundant in the environment,



Figures 1 and 2. *Diploglossus lessonae* Peracca, 1890 (C376) from Simão Dias, state of Sergipe, Brazil. **1.** Lateral view. **2.** Ventral view. Photos by Crizanto Brito De-Carvalho.

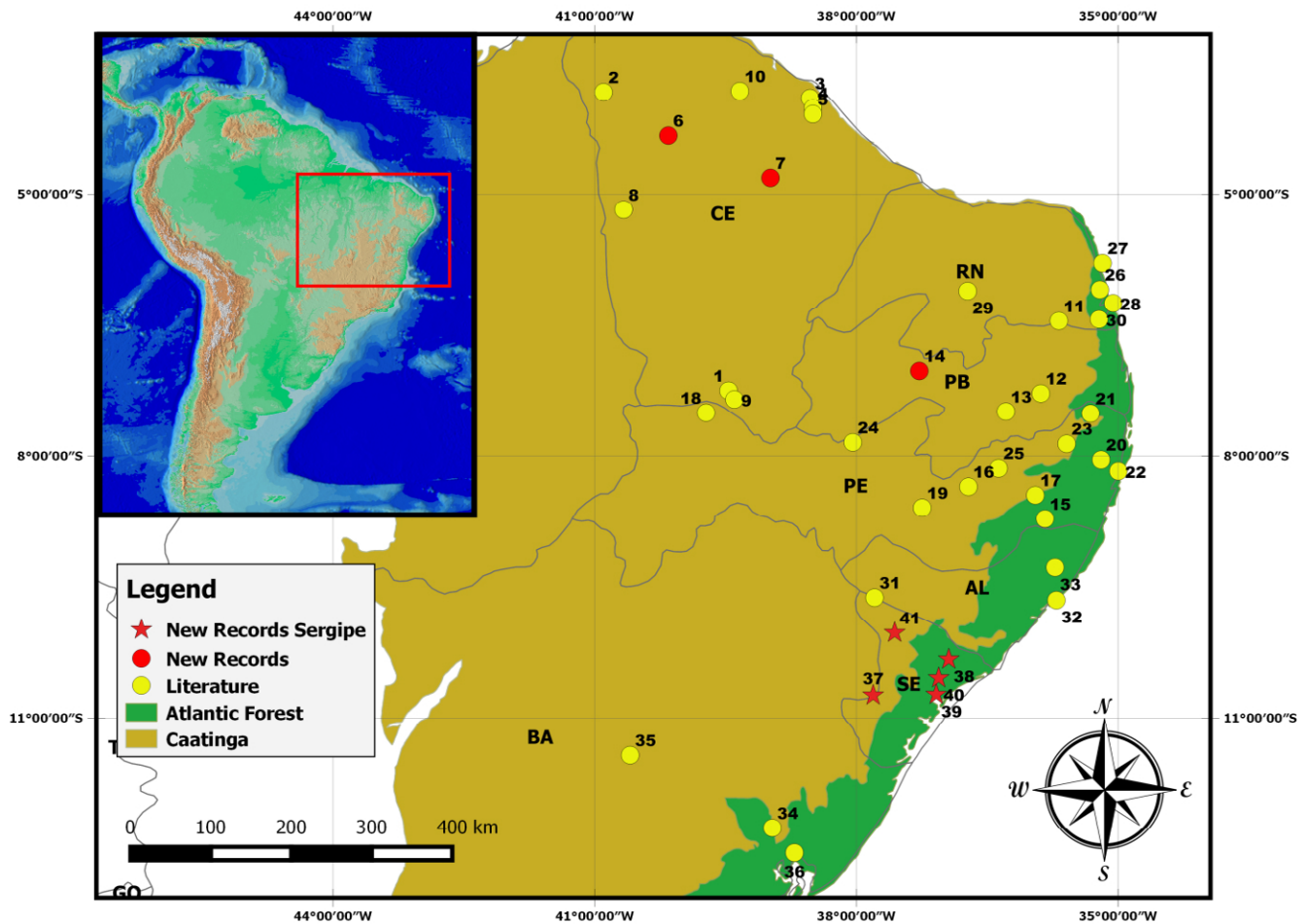


Figure 3. Geographic distribution of *Diploglossus lessonae* in Brazil. Municipalities: 1. Crato; 2. Ubajara; 3. Itaitinga; 4. Aquiraz; 5. Horizonte; 6. Santa Quitéria; 7. Quixadá; 8. Cratêus; 9. Barbalha; 10. Pentecoste; 11. Araruna; 12. Campina Grande; 13. Cabaceiras; 14. Patos; 15. Jaqueira; 16. Pesqueira; 17. Agrestina; 18. Exú; 19. Buíque; 20. São Lourenço da Mata; 21. Timbaúba; 22. Jaboatão dos Guararapes; 23. João Alfredo; 24. Triunfo; 25. Brejo da Madre de Deus; 26. Nísia Floresta; 27. Natal; 28. Tibau do Sul; 29. Tenente Laurentino Cruz; 30. Pedro Velho. 31. Piranhas; 32. Maceió; 33. Flexeiras; 34. Feira de Santana; 35. Miguel Calmon; 36. Santo Amaro; 37. Simão Dias; 38. Malhada dos Bois; 39. Maruim; 40. Capela; 41. Monte Alegre. State abbreviations: AL = Alagoas; BA = Bahia; CE = Ceará; PB = Paraíba; PE = Pernambuco; RN = Rio Grande do Norte and SE = Sergipe.

usually in the rainy season (Vitt 1992). According to our records and published data, the species are distributed in northeast Brazil, in the states of Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, and Bahia (Vanzolini 1958; Freire 1996; Borges-Nojosa and Caramaschi 2005; Torquato da Silva et al. 2006; Queiroz et al. 2010; Pedrosa et al. 2014) (Figure 3; Table 1).

Herein, we present the first records of *Diploglossus lessonae* from the state of Sergipe. These occurrences add important records in the southern part of the species' distribution (see Vanzolini 1958), in the municipalities of Simão Dias ($10^{\circ}44'20''S$, $037^{\circ}48'33''W$), Monte Alegre ($10^{\circ}01'30''S$, $037^{\circ}48'33''W$), Malhada dos Bois ($10^{\circ}19'45''S$, $036^{\circ}56'33''W$), Maruim ($10^{\circ}43'50''S$, $037^{\circ}05'10''W$), and Capela ($10^{\circ}32'30''S$, $037^{\circ}03'30''W$) (Figure 3; Table 1). The first two records are located in the Caatinga biome and the latter three in the Atlantic Forest (*sensu* Vieira et al. 2013). The municipality of Monte Alegre, located in northern Sergipe, is about 70 km from the nearest reported occurrence, Piranhas

(Alagoas; $09^{\circ}37'14''S$, $037^{\circ}47'34''W$) (SpeciesLink 2015). The record from Simão Dias municipality, located in southern Sergipe, is about 300 km from the nearest southern location, Santo Amaro (Bahia; $12^{\circ}32'46''S$, $038^{\circ}42'42''W$) (SpeciesLink 2015). In addition, we present some new records for the states of Paraíba and Ceará, along the most continuous stretch of the species distribution: Patos-PB ($07^{\circ}01'28''S$, $037^{\circ}16'48''W$), Quixadá-CE ($04^{\circ}48'45''S$, $038^{\circ}59'10''W$), and Santa Quitéria-CE ($04^{\circ}19'50''S$, $040^{\circ}09'25''W$), all located in the Caatinga biome (*sensu* MMA 2011).

The new specimens are deposited in the Coleção Herpetológica da Universidade Federal de Sergipe (CHUFS) and in Coleção Herpetológica da Universidade Federal da Paraíba (CHUFPB). The voucher numbers are in Table 1. The collections were authorized by permits #4871-1 and (#100/2011; #187/2010) issued by Instituto Chico Mendes de Conservação da Biodiversidade (ICMBIO).

We confirmed the identification of specimens by the number of midbody scales in the median region (35),

Table 1. Coordinates of the known distribution of *Diploglossus lessonae* in Brazil and consulted bibliography.

State	Point	Municipality	Latitude (S)	Longitude (W)	Reference
Ceará	1	Crato	07°15'00"	039°28'00"	Borges-Nojosa and Caramaschi (2005); Lopes et al. (2007); Ribeiro et al. (2009); Ribeiro et al. (2012)
Ceará	2	Ubajara	03°49'50"	040°53'60"	Loebmann and Haddad (2010)
Ceará	3	Itaitinga	03°54'00"	038°32'00"	Borges-Nojosa and Caramaschi (2005)
Ceará	4	Aquiraz	04°01'00"	038°30'00"	Borges-Nojosa and Caramaschi (2005)
Ceará	5	Horizonte	04°05'00"	038°30'00"	Borges-Nojosa and Caramaschi (2005)
Ceará	6	Santa Quitéria	04°19'50"	040°09'25"	New record (CHUFPB 11890)
Ceará	7	Quixadá	04°48'45"	038°59'10"	New record (CHUFPB 9495)
Ceará	8	Cratêus	05°10'41"	040°40'10"	Andrade et al. (2000)
Ceará	9	Barbalha	07°21'00"	039°24'00"	Williams and Vanzolini (1980)
Ceará	10	Pentecoste	03°49'06"	039°20'14"	Passos et al. (2016)
Paraíba	11	Araruna	06°27'13"	035°40'49"	Arzabe et al. (2005)
Paraíba	12	Campina Grande	07°16'54"	035°53'13"	Queiroz et al. (2010)
Paraíba	13	Cabaceiras	07°29'25"	036°17'15"	Rodrigues (1986)
Paraíba	14	Patos	07°01'28"	037°16'48"	New record (CHUFPB 3518)
Pernambuco	15	Jaqueira	08°43'08"	035°50'23"	Santos and Santos (2008)
Pernambuco	16	Pesqueira	08°21'00"	036°42'60"	Ferreira et al. (2008)
Pernambuco	17	Agrestina	08°26'50"	035°56'60"	Vanzolini (1974)
Pernambuco	18	Exú	07°30'15"	039°43'27"	Vitt (1985); Vitt (1992); Vitt (1995)
Pernambuco	19	Buíque	08°35'30"	037°14'50"	Muniz and Santos (2011); Pedrosa et al. (2014)
Pernambuco	20	São Lourenço da Mata	08°02'28"	035°11'46"	MCP/PUCRS – 000009015; SpeciesLink (2015)
Pernambuco	21	Timbaúba	07°30'43"	035°19'00"	Vanzolini (1958)
Pernambuco	22	Jaboatão dos Guararapes	08°10'19"	034°59'55.26"	Vanzolini (1958)
Pernambuco	23	João Alfredo	07°51'40"	035°35'27"	Vanzolini (1958)
Pernambuco	24	Triunfo	07°50'44"	038°02'31"	MCP/PUCRS – 000009014; SpeciesLink (2015)
Pernambuco	25	Brejo da Madre de Deus	08°08'25"	036°22'17"	MCP/PUCRS – 000008443; SpeciesLink (2015)
Rio Grande do Norte	26	Nísia Floresta	06°05'37"	035°12'37"	Schmidt and Inger (1951)
Rio Grande do Norte	27	Natal	05°47'25"	035°10'47"	Parker (1924); Freire (1996)
Rio Grande do Norte	28	Tibau do Sul	06°14'55"	035°03'27"	Ribeiro and Freire (2011)
Rio Grande do Norte	29	Tenente Laurentino Cruz	06°05'94"	036°42'94"	Ribeiro and Freire (2011)
Rio Grande do Norte	30	Pedro Velho	06°26'05"	035°13'12"	Vanzolini (1972)
Alagoas	31	Piranhas	09°37'14"	037°47'34"	CH/UFBA/ LAG-119; LAG-521; SpeciesLink (2015)
Alagoas	32	Maceió	09°38'59"	035°42'32"	Torquato da Silva et al. (2006)
Alagoas	33	Flexeiras	09°16'30"	035°43'27"	Torquato da Silva et al. (2006)
Bahia	34	Feira de Santana	12°15'35"	038°57'52"	Vanzolini (1958)
Bahia	35	Miguel Calmon	11°25'43"	040°35'41"	CH/UFBA – LAG-551; SpeciesLink (2015)
Bahia	36	Santo Amaro	12°32'46"	038°42'42"	MBML/UFES – 2294; 2295; SpeciesLink (2015)
Sergipe	37	Simão Dias	10°44'20"	037°48'33"	New record (CHUFS 334; 376)
Sergipe	38	Malhada dos Bois	10°19'45"	036°56'33"	New record (CHUFS 470)
Sergipe	39	Maruim	10°43'50"	037°05'10"	New record (CHUFS 4448)
Sergipe	40	Capela	10°32'30"	037°03'30"	New record (CHUFS 4507)
Sergipe	41	Monte Alegre	10°01'30"	037°33'45"	New record (CHUFPB 12048; 12049)

the elongated and slightly depressed body, and pale-yellow coloration on the head, abdomen and underside of the tail with numerous brownish lines from the head to the tip of the tail, based on the description of Peracca (1890). The number of scales (35) around the body in the median region in *Diploglossus lessonae* differs from its congener, *D. fasciatus* (Gray, 1981), that has 44 midbody scales (Boulenger 1885).

The new records for *Diploglossus lessonae* from Sergipe, Paraíba, and Ceará justify the need for more inventories of surrounding areas, such as Alagoas and Bahia states. In this southernmost range of this species' distribution, the discontinuity of records may be the result of low sampling. Regarding the occurrence of the species in caatinga semi-arid areas, it has been argued that the

present distribution pattern of *D. lessonae* is relictual (Rodrigues 2005), because this lizard is also found in "Brejos de Altitude" (Borges-Nojosa and Caramaschi 2005) and Atlantic Forest regions (Schmidt and Inger 1951; Freire 1996). However, the new information on its presence in this habitat (Rodrigues 2005; Queiroz et al. 2010; Ribeiro and Freire 2011; Pedrosa et al. 2014; Passos et al. 2016) leads us to believe that the species is widely distributed in caatingas and its semifossorial habits can make its capture difficult.

ACKNOWLEDGEMENTS

We sincerely thank Universidade Federal de Sergipe for logistics and Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), and Coordenação de

Aperfeiçoamento de Pessoal de Nível Superior (CAPES) for fellowships. We also thank all those responsible for administration of the herpetological collections mentioned here and Crizanto Brito De-Carvalho, who allowed the use of his photo. Additionally, we thank Msc. Selma Torquato da Silva for providing remarkable information. DOM thanks Conselho Nacional de Desenvolvimento Científico e Tecnológico – CNPq for a research fellowship (303610/2014-0).

LITERATURE CITED

- Andrade, G.V., P. Cascon and D.M. Borges-Nojosa. 2000. Avaliação ecológica rápida da Reserva de Serra das Almas-Crateús-Ceará. Fortaleza: The Nature Conservancy do Brasil/Associação Caatinga, Relatório Técnico. 89 pp.
- Arzabe, C., G. Skuk, G.G. Santana, F.R. Delfim, Y.C.C. Lima and S.H.F. Abrantes. 2005. Herpetofauna da área de Curimataú, Paraíba; pp. 259–274, in: E. Freire (ed.). Análise das variações da biodiversidade do bioma Caatinga: suporte a estratégias regionais de conservação. Brasília: Ministério do Meio Ambiente.
- Borges-Nojosa, D.M. and U. Caramaschi. 2005. Composição e análise comparativa da diversidade e das afinidades biogeográficas dos lagartos e anfisbenídeos (Squamata) dos brejos nordestinos; pp. 181–236, in: I.R. Leal, M. Tabarelli and J.M.C. Silva (eds.). Ecologia e conservação da Caatinga. 2nd ed. Recife: Editora da Universidade Federal de Pernambuco.
- Boulenger, G.A. 1885. Catalogue of the lizards in the British Museum (Natural History). 2nd ed. London: Stechert-Hafner Service Agency. 497 pp.
- Costa, H.C. and R.S. Bérnils. 2014. Répteis brasileiros: lista de espécies. Herpetologia Brasileira 3(3): 74–84.
- Ferreira, D.C., R. Fonseca-Neto and G.J.B. Moura. 2008. Abundância e riqueza das espécies de répteis em área de Caatinga, Pesqueira-PE [unpublished report]. Recife: Universidade Federal Rural de Pernambuco, IBAMA, SNZ.
- Freire, E.M.X. 1996. Estudo ecológico e zoogeográfico sobre a fauna de lagartos (Sauria) das dunas de Natal, Rio Grande do Norte e da restinga de Ponta de Campina, Cabedelo, Paraíba, Brasil. Revista Brasileira de Zoologia 13(4): 903–921. doi: [10.1590/S0101-81751996000400012](https://doi.org/10.1590/S0101-81751996000400012)
- Gallardo, J.M. 1966. Las especies argentinas del género *Ophiodes* Wagler (Anguidae, Sauria). Revista Museo Argentino De Ciencias Naturales Bernardino Rivadavia 9(6): 123–144.
- Gray, J.E. 1831. A synopsis of the species of the class Reptilia; pp. 481, in: E. Griffith and E. Pidgeon (eds.). The animal kingdom arranged in conformity with its organisation by the Baron Cuvier with additional descriptions of all the species hither named, and of many before noticed. London: Whittaker, Treacher and Company.
- Loebmann, D. and C.F.B. Haddad. 2010. Amphibians and reptiles from a highly diverse area of the Caatinga domain: composition and conservation implications. Biota Neotropica 10(3): 227–256. doi: [10.1590/S1676-06032010000300026](https://doi.org/10.1590/S1676-06032010000300026)
- Lopes, S.G., L.E.M. Silva, E.F. Dantas and W.O. Almeida. 2007. Infecção por helmintos em três espécies de lagartos do nordeste brasileiro. Cadernos de Cultura e Ciência 1(1): 1–9.
- Macey, J.R., J.A. Schulte, A. Larson, B.S. Tuniyev, N. Orlov and T.J. Papenfuss. 1999. Molecular phylogenetics, tRNA evolution, and historical biogeography in anguid lizards and related taxonomic families. Molecular Phylogenetics and Evolution 12(3): 250–272. doi: [10.1006/mpev.1999.0615](https://doi.org/10.1006/mpev.1999.0615)
- MMA. (Ministério do Meio Ambiente). 2011. Monitoramento do desmatamento nos biomas brasileiros por satélite: Monitoramento do Bioma Caatinga. Accessed at http://www.mma.gov.br/estruturas/sbf_chm_rbbio/arquivos/relatorio_tecnico_caatinga_2008_2009_72.pdf, 14 October 2015.
- Muniz, S.L.S. and E.M. Santos. 2011. Lista preliminar de répteis do vale do Catimbau-Buíque/PE; pp. 395–405, in: G.J.B. Moura, E.M. Santos, M.A.B. Oliveira and M.C.C. Cabral (eds.). Herpetologia no Estado de Pernambuco. Brasília: Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis/Ministério do Meio Ambiente.
- Parker, H.W. 1924. LXXV.—Description of a new Anguid Lizard from Brazil. Annals & Magazine of Natural History 13(9): 586–588. doi: [10.1080/00222932408633084](https://doi.org/10.1080/00222932408633084)
- Passos, D.C., P.C.M.D. Mesquita and D.M. Borges-Nojosa. 2016. Diversity and seasonal dynamic of a lizard assemblage in a Neotropical semiarid habitat. Studies on Neotropical Fauna and Environment 51(1): 19–28. doi: [10.1080/01650521.2016.1149383](https://doi.org/10.1080/01650521.2016.1149383)
- Passos, D.C., D.Z. Silva and D.M. Borges-Nojosa. 2011. *Diploglossus lessonae* (Brazilian Galliwasp): diet. Herpetological Review 42(1): 94.
- Pedrosa, I.M.M.C., T.B. Costa, R.G. Faria, F.G.R. França, D.O. Laranjeiras, T.C.S.P. Oliveira, C.N.S. Palmeira, S. Torquato, T. Mott and G.H.C. Vieira. 2014. Herpetofauna of protected areas in the Caatinga III: The Catimbau National Park, Pernambuco, Brazil. Biota Neotropica 14(4): 1–12. doi: [10.1590/1676-06032014004614](https://doi.org/10.1590/1676-06032014004614)
- Peracca, M.G. 1890. Descrizione di una nuova specie del gen. *Diploglossus* Wieg. Bollettino dei Musei di Zoologia ed Anatomia Comparata della R. Università di Torino 5(77): 1–5.
- Porat, C.O. 1876. Om några exotiska Myriopoder: Bihang till K. Svenska vet. Handlingar 4(7): 3–48.
- Pyron, R.A., F.T. Burbrink and J.J. Wiens. 2013. A phylogeny and revised classification of Squamata, including 4161 species of lizards and snakes. BMC Evolutionary Biology 13(1): 1–93. doi: [10.1186/1471-2148-13-93](https://doi.org/10.1186/1471-2148-13-93)
- Queiroz, R.N.M., L.S. Alves, B.H.S. Oliveira and H. Neves. 2010. Análise da herpetofauna do Complexo Aluizio Campos. Revista Brasileira de Informações Científicas 1(1): 22–28.
- Ribeiro, L.B. and E.M.X. Freire. 2011. Lagartos como bioindicadores: testando metodologia de avaliação da qualidade ambiental de caatingas e áreas florestadas; pp. 145–186, in: E.M.X. Freire, G.A. Cândido and P.V. Azevedo (eds.). Múltiplos olhares sobre o semi-árido brasileiro: perspectivas interdisciplinares. Natal: Editora Universitária da Universidade Federal do Rio Grande do Norte.
- Ribeiro, S.C., F.S. Ferreira, S.V. Brito, G.G. Santana, W.L.S. Vieira, R.R. Nóbrega and W.O. Almeida. 2009. The squamate fauna of the Chapada do Araripe, Northeastern Brazil. Cadernos de Cultura e Ciência 1(1): 67–76.
- Ribeiro, S.C., I.J. Roberto, D.L. Sales, R.W. Ávila and W.O. Almeida. 2012. Amphibians and reptiles from the Araripe bioregion, northeastern Brazil. Salamandra 48(3): 133–146.
- Rodrigues, M.T. 1986. Uma nova espécie do gênero *Phyllopezus* de Cabaceiras: Paraíba: Brasil, com comentários sobre a fauna de lagartos da área (Sauria, Gekkonidae). Papéis Avulsos de Zoologia 36(20): 237–250. doi: [10.5962/bhl.part.18420](https://doi.org/10.5962/bhl.part.18420)
- Rodrigues, M.T. 2005. Herpetofauna da Caatinga; pp. 181–236, in: I.R. Leal, M. Tabarelli and J.M.C. Silva (eds.). Ecologia e conservação da Caatinga. 2nd ed. Recife: Editora da UFPE.
- Santos, S.P.L. and E.M. Santos. 2008. Herpetofauna da RPPN Frei Caneca (Jaqueira/PE), com novas ocorrências de cinco espécies de anfíbios anuros para Pernambuco [unpublished report]. Recife: UFRPE, IBAMA, SNZ.
- Schmidt, K.P. and R.F. Inger. 1951. Amphibians and reptiles of the Hopkins-Branner expedition to Brazil. Fieldiana Zoology 31(42): 439–465.
- SpeciesLink. 2015. Sistema de informação distribuído para coleções biológicas: a integração do Species Analyst e do SinBiota (FAPESP). Accessed at <http://smlink.cria.org.br/>, 12 August 2016.
- Spix, J.B. 1825. Animalia nova sive species novae Testudinum et Ranarum, quas in itinere per Brasiliam annis MDCCCXVII–

- MDCCCXX jussu et auspiciis Maximiliani Josephi I. Bavariae Regis suscepto collegit et descripsit Dr. J. B. de Spix. Lipsiae: T. O. Weigel; F. S. Hübschmanni, Monachii. 26 pp.
- Torquato da Silva, S., U.G. Silva, G.A.B. Sena and F.A.C. Nascimento. 2006. A diversidade da Mata Atlântica alagoana: anfíbios e répteis; pp. 65–76, in: F.B.P.M. Moura (ed.). A Mata Atlântica em Alagoas. Maceió: EDUFAL.
- Vanzolini, P.E. 1958. Sobre *Diploglossus lessonae*, com notas biométricas e sobre a evolução ontogenética do padrão de colorido (Sauria, Anguidae). *Papéis Avulsos de Zoologia* 13(1): 179–221.
- Vanzolini, P.E. 1972. Miscellaneous notes on the ecology of some Brazilian lizards (Sauria). *Papéis Avulsos de Zoologia* 26(8): 83–115.
- Vanzolini, P.E. 1974. Ecological and geographical distribution of lizards in Pernambuco, northeastern Brasil (Sauria). *Papéis Avulsos de Zoologia* 28(4): 61–90.
- Vieira, T.R.S., D.G. Oliveira, F.M.G. Pessoa and L.J. Gomes. 2013. Análise dos processos de averbação das reservas legais no Estado de Sergipe. *Floresta e Ambiente* 20(2): 149–158. doi: [10.4322/floram.2013.014](https://doi.org/10.4322/floram.2013.014)
- Vitt, L.J. 1985. On the biology of the little known anguid lizard, *Diploglossus lessonae* in northeast Brazil. *Papéis Avulsos de Zoologia* 36(7): 69–76.
- Vitt, L.J. 1992. Lizard mimics millipede. *National Geographic Research and Exploration* 8(1): 76–95.
- Vitt, L.J. 1995. The ecology of tropical lizards in the caatinga of northeast Brazil. *Occasional Papers of the Oklahoma Museum of Natural History* 1(1): 1–29.
- Williams, E.E. and P.E. Vanzolini. 1980. Notes and biogeographic comments on anoles from Brasil. *Papéis Avulsos de Zoologia* 34(6): 99–108.

Author contributions: FLSC, DOS, RGF, AB and DOM wrote the text, FLSC, DOS, AB and DOM collected the data.

Received: 27 November 2015

Accepted: 16 September 2016

Academic editor: Josué Anderson Rêgo Azevedo